

REMARKS

This communication is in response to the Office Action of October 2, 2007.

Claims 1-32 are pending in this application. Claims 1, 10, 16, 27, and 30 have been amended to more specifically point out and distinctly claim the subject matter of the invention.

Specifically, Claims 1 and 30 have been amended to include the limitation that the CBR and VBR controllers operate “in tandem and independently” of each other. Claims 10 and 16 have been amended to include the limitations of “classifying macroblocks by type” within a current picture and that the “statistical indicator indicative of complexity of each type of macroblock” is determined “based on quantization-dependent bits in each type of macroblock.” Claim 27 has been amended to include the limitation that “changes in long-term average bit rate” are tracked “by feedback control based on a difference between said average bit rate and an actual bit rate.” Support for the amendments is found throughout the specification, and in particular, at paragraphs [0023], [0028], [0029], [0031], [0040], [0060], [0063]. No new matter has been added.

Claims 1-32 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Ribas-Corbera, U.S. Patent No. 6,535,251 (“Ribas-Corbera”). Applicants traverse the rejections. Reconsideration of these claims is respectfully requested.

Applicants respectfully submit that Ribas-Corbera does not disclose the rate controller as claimed in Claim 1 or the method as claimed in Claim 30 because the video encoder described therein does not include a VBR controller to generate a first quantization step size, a CBR controller “operating in tandem and independently of the VBR controller” to generate a second quantization step size, and a selector to select the maximum of the first and second quantization step sizes.

Ribas-Corbera discloses a single encoder rate control unit 56 (FIG. 1 of Ribas-Corbera) that operates as either a VBR controller or as a CBR controller. As described in Ribas-Corbera, “[A]s will be appreciated from this description, the preferred embodiment of the invention is a VBR method with the capability of reaction of a CBR method. Indeed, the method of the

invention selects a quantization step Q using the above described near-CBR method, and limits Q when appropriate to operate in VBR mode” (Ribas-Corbera, col. 9, lines 25-33).

Furthermore, “[F]rom FIG. 14, it is observed that when P is smaller than 13, it can be advantageous to turn off the VBR mode of the encoder, and use true CBR rate control. This is because there is little benefit from using VBR rate control when the maximum and average bit rates are close” (Ribas-Corbera, col., 11, lines 4-8). As it can be seen on FIG. 14, encoder rate control unit 56 operates in either CBR mode or in VBR mode to generate a single quantization step size.

In contrast, the rate controller of Claim 1 and the method claimed in Claim 30 includes two rate controllers, one of a VBR type and the other of a CBR type, operating “in tandem and independently” of each other to generate two quantization step sizes, one of which (i.e., the maximum of the two) is selected by a selector as the quantization step size for quantizing a current picture. There is no disclosure, teaching, or suggestion in Ribas-Corbera that encoder rate control unit 56 operates in both modes “in tandem and independently” to generate two quantization step sizes, one from a VBR controller and another from a CBR controller.

Therefore, Applicants respectfully submit that Ribas-Corbera does not anticipate Claims 1 and 30, as well as Claims 2-9 and 31-32, which respectfully depend there from. Since Ribas-Corbera fails to anticipate the claimed inventions of Claims 1 and 30, Applicants respectfully submit that Claims 1 and 30 and their respective dependent claims, distinguish from, and are allowable over, the cited reference.

Ribas-Corbera also does not disclose “a constant bit rate controller” of the type called for in Claim 10 and “a method of constant bit rate (CBR) rate control” of the type called for in Claim 16. Both the constant bit rate controller claimed in Claim 10 and the method of constant bit rate control claimed in Claim 16 “classify macroblocks within a current picture by type” and calculate a “statistical indicator of the complexity of each of said at least two different types of macroblocks based on quantization-dependent bits in the each of said at least two different types of macroblocks.”

In contrast, as described in Ribas-Corbera, “[T]he means for generating the complexity parameter generates complexity parameters XI, XP, XB for Ni I-type frames, Np P-type frames

and Nb B-type frames” (Ribas-Corbera, col. 4, lines 44-46). That is, Ribas-Corbera discloses classifying frames, rather than macroblocks. Complexity parameters are computed for three different type frames: I-type frames, P-type frames, and B-type frames. There is no disclosure, suggestion, or teaching in Ribas-Corbera that macroblocks within the frames are classified and associated with their own complexity parameters.

There is also no disclosure, suggestion, or teaching in Ribas-Corbera that the complexity parameters are computed “based on quantization-dependent bits.” “For intra blocks, quantization-dependent bits are those bits resulting from the encoding of AC DCT coefficients. For non-intra blocks, quantization-dependent bits are those bits resulting from the encoding of all DCT coefficients. In both cases, quantization-dependent bits exclude bits resulting from the encoding of motion vectors, headers, and skipped macroblocks” (Specification, paragraph [0028]).

While “[I]t will be understood that the programmable rate controller implements separate rate-quantization models for quantization-dependent and quantization-independent bits” (Specification, paragraph [0028]), the encoder rate control unit 56 disclosed in Ribas-Corbera makes no distinction of quantization-dependent and quantization-independent bits. Its complexity parameters are computed for classified frames, rather than for quantization-dependent bits within classified macroblocks.

Therefore, Applicants respectfully submit that Ribas-Corbera does not anticipate Claims 10 and 16, as well as Claims 11-15 and 17-26, which respectfully depend there from. Since Ribas-Corbera fails to anticipate the claimed inventions of Claims 10 and 16, Applicants respectfully submit that Claims 10 and 16 and their respective dependent claims, distinguish from, and are allowable over, the cited reference.

Regarding independent Claim 27, Ribas-Corbera does not disclose tracking changes in long-term average bit rate “by feedback control based on a difference between said average bit rate and an actual bit rate.” As shown in FIG. 7, the VBR rate controller operates as a feedback control system with a feedback transfer function.

Applicants can find no disclosure in the sections cited by the Examiner that the long-term average bit rate is tracked, let alone by a feedback control system. As shown and described in

Ribas-Corbera with reference to FIG. 6, the updating that takes place in step 180 is performed on a GOP basis rather than on a "long-term" basis with a feedback control system. Furthermore, there is also no disclosure, suggestion, or teaching in Ribas-Corbera that long-term tracking is performed for the average bit rate. The updating step 180 disclosed in Ribas-Corbera updates the total number of bits for a GOP, i.e., B_{GOP} , rather than the average bit rate, i.e., B_{AVG} .

Therefore, Applicants respectfully submit that Ribas-Corbera does not anticipate Claim 27, as well as Claims 28-29, which respectfully depend there from. Since Ribas-Corbera fails to anticipate the claimed invention of Claims 27, Applicants respectfully submit that Claim 27 and its respective dependent claims, distinguish from, and are allowable over, the cited reference.

In view of the foregoing amendments, Applicants believe that all rejections are rendered moot, and respectfully submit that the subject application is in condition for allowance. The Examiner is invited to contact the undersigned if there are any residual issues that can be resolved through a telephone call.

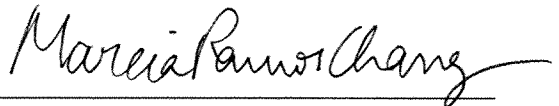
The Commissioner is hereby authorized to charge any appropriate fees to Deposit Account No. 50-1283.

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